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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE  
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

JEAN-YVES CHENARD et al. )  
Serial No.: 07/870,759 ) Group Art Unit: 1511  
Filed: April 20, 1992 ) Examiner: V. Hoke  
For: IMPROVEMENT IN THE )  
STABILIZATION OF VINYL )  
HALIDE POLYMERS )

CLAIMS ON APPEAL

176. A method of stabilizing a vinyl halide resin comprising the steps of:

- (a) adding to the vinyl halide resin a mono- or diorganotin compound wherein at least one atom bonded to tin is a halogen; and
- (b) adding to the vinyl halide resin a mercapto alkanol ester of a monocarboxylic acid;

the mono-or diorganotin compound and the mercapto alkanol ester of a monocarboxylic acid being present in an amount effective to stabilize the vinyl halide resin.

177. The method of claim 176, wherein the mercapto alkanol ester of a monocarboxylic acid has the formula:



wherein R is a linear or branched alkyl or alkenyl, aryl or aralkyl containing at least two carbon atoms; and R' designates a C<sub>2</sub> to C<sub>18</sub> alkylene.

178. The method of claim 177, wherein R contains 6 to 38 carbon atoms.

179. The method of claim 177, wherein R contains 8 to 18 carbon atoms.

180. The method of claim 179, wherein R' contains 2 to 6 carbon atoms.

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B. CHENARD  
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181. The method of claim 176, wherein the monocarboxylic acid is selected from the group consisting of caprylic, pelargonic, capric, undecanoic, lauric, myristic, palmitic, stearic, isostearic, and mixtures thereof.

182. The method of claim 176, wherein the mercapto alkanol ester of a monocarboxylic acid is selected from the group consisting of mercapto ethyl stearate, 3-thio-glyceryl myristate, mercapto ethyl palmitate, and mercapto ethyl myristate.

183. The method of claim 176, wherein the vinyl halide resin is polyvinyl chloride.

193. The composition of claim 237, wherein the mercapto alkanol ester of a monocarboxylic acid has the formula:



wherein R is a linear or branched alkyl or alkenyl, aryl or aralkyl containing at least two carbon atoms; and R' designates a C<sub>2</sub> to C<sub>18</sub> alkylene.

194. The composition of claim 237, wherein R contains 6 to 38 carbon atoms.

195. The composition of claim 237, wherein R contains 8 to 18 carbon atoms.

196. The composition of claim 237, wherein R contains 2 to 6 carbon atoms.

197. The composition of claim 237, the monocarboxylic acid is selected from the group consisting of caprylic, pelargonic, capric, undecanoic, lauric, myristic, palmitic, stearic, isostearic, and mixtures thereof.

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BARRETT CARPENT  
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198. The composition of claim 237, wherein the mercapto alkanol ester of a monocarboxylic acid is selected from the group consisting of mercapto ethyl stearate, 3-thio-glyceryl myristate, mercapto ethyl palmitate and mercapto ethyl myristate.

200. The vinyl halide resin composition of claim 239, wherein the mercapto alkanol ester of a monocarboxylic acid has the formula:



wherein R is a linear or branched alkyl or alkenyl, aryl or aralkyl containing at least two carbon atoms; and R' designates a C<sub>2</sub> to C<sub>18</sub> alkylene.

201. The vinyl halide resin composition of claim 239, wherein R contains 6 to 38 carbon atoms.

202. The vinyl halide resin composition of claim 239, wherein R contains 8 to 18 carbon atoms.

203. The vinyl halide resin composition of claim 239, wherein R contains 2 to 6 carbon atoms.

204. The vinyl halide resin composition of claim 239, the monocarboxylic acid is selected from the group consisting of caprylic, pelargonic, capric, undecanoic, lauric, myristic, palmitic, stearic, isostearic, and mixtures thereof.

205. The vinyl halide resin composition of claim 239, wherein the mercapto alkanol ester of a monocarboxylic acid is selected from the group consisting of mercapto ethyl stearate, 3-thio-glyceryl myristate, mercapto ethyl palmitate and mercapto ethyl myristate.

206. The vinyl halide resin composition of claim 239, wherein the mercapto alkanol ester of a monocarboxylic acid is present in the range of 0.1 % wt. to 5 % wt. of the vinyl halide resin.

207. The vinyl halide resin composition of claim 239, wherein the vinyl halide resin is polyvinyl chloride.

209. The composition of claim 241, wherein the mercapto alkanol ester of a monocarboxylic acid has the formula:



wherein R is a linear or branched alkyl or alkenyl, aryl or aralkyl containing at least two carbon atoms; and R' designates a C<sub>2</sub> to C<sub>18</sub> alkylene.

210. The composition of claim 241, wherein R contains 6 to 38 carbon atoms.

211. The composition of claim 241, wherein R contains 2 to 6 carbon atoms.

212. The composition of claim 241, the monocarboxylic acid is selected from the group consisting of caprylic, pelargonic, capric, undecanoic, lauric, myristic, palmitic, stearic, isostearic, and mixtures thereof.

213. The composition of claim 241, wherein the mercapto alkanol ester of a monocarboxylic acid is selected from the group consisting of mercapto ethyl stearate, 3-thio-glycerol myristate, mercapto ethyl palmitate and mercapto ethyl myristate.

214. The composition of claim 241, further comprising a vinyl halide resin.

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215. The composition of claim 241, wherein the product produced by mixing the organotin compound and the mercapto alkanol ester of a monocarboxylic acid are present in an amount effective to stabilize the vinyl halide resin against heat or light.

216. The composition of claim 241, wherein the mercapto alkanol ester of a monocarboxylic acid is present in the range of 0.1 % wt. to 5 % wt. of the vinyl halide resin.

217. The composition of claim 241, wherein the vinyl halide resin is polyvinyl chloride.

219. The method of claim 243, wherein the mercapto alkanol ester of a monocarboxylic acid has the formula:



wherein R is a linear or branched alkyl or alkenyl, aryl or aralkyl containing at least two carbon atoms; and R' designates a C<sub>2</sub> to C<sub>18</sub> alkylene.

220. The method of claim 243, wherein R contains 6 to 38 carbon atoms.

221. The method of claim 243, wherein R contains 8 to 18 carbon atoms.

222. The method of claim 243, wherein R contains 2 to 6 carbon atoms.

223. The method of claim 243, the monocarboxylic acid is selected from the group consisting of caprylic, pelargonic, capric, undecanoic, lauric, myristic, palmitic, stearic, isostearic, and mixtures thereof.

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224. The method of claim 243, wherein the mercapto alkanol ester of a monocarboxylic acid is selected from the group consisting of mercapto ethyl stearate, 3-thio-glyceryl myristate, mercapto ethyl palmitate and mercapto ethyl myristate.

225. The method of claim 243, wherein the vinyl halide resin is polyvinyl chloride.

227. The method of claim 245, wherein the mercapto alkanol ester of a monocarboxylic acid has the formula:



wherein R is a linear or branched alkyl or alkenyl, aryl or aralkyl containing at least two carbon atoms; and R' designates a C<sub>2</sub> to C<sub>18</sub> alkylene.

228. The method of claim 245, wherein R contains 6 to 38 carbon atoms.

229. The method of claim 245, wherein R contains 8 to 18 carbon atoms.

230. The method of claim 245, wherein R contains 2 to 6 carbon atoms.

231. The method of claim 245, the monocarboxylic acid is selected from the group consisting of caprylic, pelargonic, capric, undecanoic, lauric, myristic, palmitic, stearic, isostearic, and mixtures thereof.

232. The method of claim 245, wherein the mercapto alkanol ester of a monocarboxylic acid is selected from the group consisting of mercapto ethyl stearate, 3-thio-glyceryl myristate, mercapto ethyl palmitate and mercapto ethyl myristate.

233. The method of claim 245, wherein the vinyl halide resin is polyvinyl chloride.

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237. A composition comprising:

- (a) a mono- or dialkyltin bis(isooctyl mercapto acetate) compound wherein the alkyl is a  $C_1$  to  $C_8$  alkyl; and
- (b) a mercapto alkanol ester of a monocarboxylic acid.

238. A composition according to claim 237, wherein said mono- or dialkyltin bis(isooctyl mercapto acetate) compound is selected from the group consisting of di-n-octyltin bis-(isooctyl mercapto acetate); di-n-butyltin bis-(isooctyl mercapto acetate); a mixture of an anhydride of thiobutyl stannic acid with di-n-butyltin bis-(isodecyl mercapto acetate); and a condensation polymer of butyl stannic acid and butyl thiostannic acid.

239. A vinyl halide resin composition comprising:

- (a) a vinyl halide resin;
- (b) a mono- or dialkyltin bis(isooctyl mercapto acetate) compound wherein the alkyl is a  $C_1$  to  $C_8$  alkyl; and
- (c) a mercapto alkanol ester of a monocarboxylic acid.

240. A composition according to claim 239, wherein said mono- or dialkyltin bis(isooctyl mercapto acetate) compound is selected from the group consisting of di-n-octyltin bis-(isooctyl mercapto acetate); di-n-butyltin bis-(isooctyl mercapto acetate); a mixture of an anhydride of thiobutyl stannic acid with di-n-butyltin bis-(isodecyl mercapto acetate); and a condensation polymer of butyl stannic acid and butyl thiostannic acid.

241. A composition comprising a product produced by mixing:

- (a) a mono- or dialkyltin bis(isooctyl mercapto acetate) compound wherein the alkyl is a  $C_1$  to  $C_8$  alkyl; and
- (b) a mercapto alkanol ester of a monocarboxylic acid.

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20540



242. A composition according to claim 241, wherein said mono- or dialkyltin bis(isooctyl mercapto acetate) compound is selected from the group consisting of di-n-octyltin bis-(isooctyl mercapto acetate); di-n-butyltin bis-(isooctyl mercapto acetate); a mixture of an anhydride of thiobutyl stannic acid with di-n-butyltin bis-(isodecyl mercapto acetate); and a condensation polymer of butyl stannic acid and butyl thiostannic acid.

243. A method of stabilizing a vinyl halide resin comprising the steps of:

(a) adding to the vinyl halide resin a mono- or dialkyltin bis(isooctyl mercapto acetate) compound wherein the alkyl is a  $C_1$  to  $C_8$  alkyl; and

(b) adding to the vinyl halide resin a mercapto alkanol ester of a monocarboxylic acid.

244. A method according to claim 243, wherein said mono- or dialkyltin bis(isooctyl mercapto acetate) compound is selected from the group consisting of di-n-octyltin bis-(isooctyl mercapto acetate); di-n-butyltin bis-(isooctyl mercapto acetate); a mixture of an anhydride of thiobutyl stannic acid with di-n-butyltin bis-(isodecyl mercapto acetate); and a condensation polymer of butyl stannic acid and butyl thiostannic acid.

245. A method of stabilizing a vinyl halide resin comprising the step of adding to the vinyl halide resin in an amount effective to stabilize the vinyl halide resin a product produced by mixing:

JOHN D. HARRIS  
RICHARD H. HENDERSON  
BARBARA C. GARRITT  
& DINNER  
1000 15TH ST. N.W.  
WASHINGTON, D.C. 20005  
1-202-462-4000

(a) a mono- or dialkyltin bis(isooctyl mercapto acetate) compound wherein the alkyl is a C<sub>1</sub> to C<sub>8</sub> alkyl; and

(b) a mercapto alkanol ester of a monocarboxylic acid.

246. A method according to claim 245, wherein said mono- or dialkyltin bis(isooctyl mercapto acetate) compound is selected from the group consisting of di-n-octyltin bis-(isooctyl mercapto acetate); di-n-butyltin bis-(isooctyl mercapto acetate); a mixture of an anhydride of thiobutyl stannic acid with di-n-butyltin bis-(isodecyl mercapto acetate); and a condensation polymer of butyl stannic acid and butyl thiostannic acid

247. A composition comprising a product produced by mixing in amounts effective to stabilize vinyl halide resins:

(i) a mono- or diorganotin compound wherein at least one atom bonded to tin is sulfur; and

(ii) a mercapto alkanol ester of a monocarboxylic acid.

248. The composition of claim 247, wherein in the mono- or di- organotin compound there is bonded to tin at least one alkyl mercapto ester group.

249. The composition of claim 247, wherein at least one sulfur bonded to tin is the residue of a mercaptan.

250. The composition of claim 247, wherein at least one sulfur bonded to tin is the residue of a mercapto acid.

251. The composition of claim 247, wherein at least one sulfur bonded to tin is the residue of a mercapto alcohol.

252. The composition of claim 247, wherein at least one sulfur bonded to tin is the residue of a mercapto acid ester.

253. The composition of claim 247, wherein at least one sulfur bonded to tin is the residue of a mercapto alcohol ester.

JEAN ES CHENARD  
PARADE CARRE  
5 CHENARD  
PARADE CARRE  
5 CHENARD

254. The composition of claim 247, wherein the mono- or di-organotin compound is selected from the group consisting of di-n-octyltin bis-(isooctyl mercapto acetate); di-n-butyltin bis-(isooctyl mercapto acetate); a mixture of an anhydride of thiobutyl stannic acid with di-n-butyltin bis-(isodecyl mercapto acetate); and a condensation polymer of butyl stannic acid and butyl thiostannic acid.

255. The composition of claim 247, wherein the mercapto alkanol ester of a monocarboxylic acid has the formula:



wherein R is a linear or branched alkyl or alkenyl, aryl or aralkyl containing at least two carbon atoms; and R' designates a C<sub>2</sub> to C<sub>18</sub> alkylene.

256. The composition of claim 255, wherein R contains 6 to 38 carbon atoms.

257. The composition of claim 256, wherein R contains 8 to 18 carbon atoms.

258. The composition of claim 255, wherein R' contains 2 to 6 carbon atoms.

259. The composition of claim 247, wherein the monocarboxylic acid is selected from the group consisting of caprylic, pelargonic, capric, undecanoic, lauric, myristic, palmitic, stearic, isostearic, and mixtures thereof.

260. The composition of claim 247, wherein the mercapto alkanol ester of a monocarboxylic acid is selected from the group consisting of mercapto ethyl stearate, 3-thio-glyceryl myristate, mercapto ethyl palmitate and mercapto ethyl myristate.

JEAN VES CHENARD  
FANNON HENDERSON  
PATENT ATTORNEYS  
300 N. 1ST ST.  
MINNEAPOLIS, MINN.  
100-100000

261. The composition of claim 247, further comprising a vinyl halide resin.

262. The composition of claim 261, wherein the product produced by mixing the organotin compound and the mercapto alkanol ester of a monocarboxylic acid are present in an amount effective to stabilize the vinyl halide resin against heat or light.

263. The composition of claim 261, wherein the mercapto alkanol ester of a monocarboxylic acid is present in the range of 0.1 % wt. to 5 % wt. of the vinyl halide resin.

264. The composition of claim 261, wherein the vinyl halide resin is polyvinyl chloride.

265. A method of stabilizing a vinyl halide resin comprising adding to the vinyl halide resin in an amount effective to stabilize the vinyl halide resin a product produced by mixing:

(i) a mono- or diorganotin compound wherein at least one atom bonded to tin is sulfur; and

(ii) a mercapto alkanol ester of a monocarboxylic acid.

266. The method of claim 265, wherein in the mono- or diorganotin compound there is bonded to tin at least one alkyl mercapto ester group.

267. The method of claim 265, wherein at least one sulfur bonded to tin is the residue of a mercaptan.

268. The method of claim 265, wherein at least one sulfur bonded to tin is the residue of a mercapto acid.

269. The method of claim 265, wherein at least one sulfur bonded to tin is the residue of a mercapto alcohol.

270. The method of claim 265, wherein at least one sulfur bonded to tin is the residue of a mercapto acid ester.

JEAN-PIERRE CHENARD  
FALGOUT CARRETT  
5 DINER  
1001 STREET  
MONTREAL, QUEBEC  
H3B 2K6

271. The method of claim 265, wherein at least one sulfur bonded to tin is the residue of a mercapto alcohol ester.

272. The method of claim 265, wherein the mono- or di-organotin compound is selected from the group consisting of di-n-octyltin bis-(isooctyl mercapto acetate); di-n-butyltin bis-(isooctyl mercapto acetate); a mixture of an anhydride of thiobutyl stannic acid with di-n-butyltin bis-(isodecyl mercapto acetate); and a condensation polymer of butyl stannic acid and butyl thiostannic acid.

273. The method of claim 265, wherein the mercapto alkanol ester of a monocarboxylic acid has the formula:



wherein R is a linear or branched alkyl or alkenyl, aryl or aralkyl containing at least two carbon atoms; and R' designates a C<sub>2</sub> to C<sub>18</sub> alkylene.

274. The method of claim 273, wherein R contains 6 to 38 carbon atoms.

275. The method of claim 274, wherein R contains 8 to 18 carbon atoms.

276. The method of claim 273, wherein R' contains 2 to 6 carbon atoms.

277. The method of claim 265, wherein the monocarboxylic acid is selected from the group consisting of caprylic, pelargonic, capric, undecanoic, lauric, myristic, palmitic, stearic, isostearic, and mixtures thereof.

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FINNIGAN, HENDERSON  
PARSONS, GARRETT  
& DUNN  
1000 15TH ST. N.W.  
WASHINGTON, D.C. 20005  
1-800-424-4000

278. The method of claim 265, wherein the mercapto alkanol ester of a monocarboxylic acid is selected from the group consisting of mercapto ethyl stearate, 3-thio-glyceryl myristate, mercapto ethyl palmitate and mercapto ethyl myristate.

279. The method of claim 265, wherein the vinyl halide resin is polyvinyl chloride.

280. In a composition for stabilizing a vinyl halide resin containing a mono- or diorganotin compound wherein at least one atom bonded to tin is sulfur, the improvement comprising the addition of a mercapto alkanol ester of a monocarboxylic acid.

281. The composition of claim 280, wherein in the mono- or di- organotin compound there is bonded to tin at least one alkyl mercapto ester group.

282. The composition of claim 280, wherein at least one sulfur bonded to tin is the residue of a mercaptan.

283. The composition of claim 280, wherein at least one sulfur bonded to tin is the residue of a mercapto acid.

284. The composition of claim 280, wherein at least one sulfur bonded to tin is the residue of a mercapto alcohol.

285. The composition of claim 280, wherein at least one sulfur bonded to tin is the residue of a mercapto acid ester.

286. The composition of claim 280, wherein at least one sulfur bonded to tin is the residue of a mercapto alcohol ester.

287. The composition of claim 280, wherein the mono- or di-organotin compound is selected from the group consisting of di-n-octyltin bis-(isooctyl mercapto acetate); di-n-butyltin bis-(isooctyl mercapto acetate); a mixture of an anhydride of thiobutyl stannic acid with di-n-butyltin bis-(isodecyl mercapto

JEAN-YVES CHENARD  
FREDERICK HENDERSON  
FREDERICK GARRETT  
B. CHENARD  
J. CHENARD  
J. CHENARD  
J. CHENARD  
J. CHENARD

acetate); and a condensation polymer of butyl stannic acid and butyl thiostannic acid.

288. The composition of claim 280, wherein the mercapto alkanol ester of a monocarboxylic acid has the formula:



wherein R is a linear or branched alkyl or alkenyl, aryl or aralkyl containing at least two carbon atoms; and R' designates a C<sub>2</sub> to C<sub>18</sub> alkylene.

289. The composition of claim 288, wherein R contains 6 to 38 carbon atoms.

290. The composition of claim 289, wherein R contains 8 to 18 carbon atoms.

291. The composition of claim 288, wherein R' contains 2 to 6 carbon atoms.

292. The composition of claim 280, wherein the monocarboxylic acid is selected from the group consisting of caprylic, pelargonic, capric, undecanoic, lauric, myristic, palmitic, stearic, isostearic, and mixtures thereof.

293. The composition of claim 280, wherein the mercapto alkanol ester of a monocarboxylic acid is selected from the group consisting of mercapto ethyl stearate, 3-thio-glycerol myristate, mercapto ethyl palmitate and mercapto ethyl myristate.

294. The composition of claim 280, wherein the mercapto alkanol ester of a monocarboxylic acid is present in the range of 0.1 % wt. to 5 % wt. of the vinyl halide resin to be stabilized.

295. The composition of claim 280, wherein the vinyl halide resin is polyvinyl chloride.

JOHN J. HENDERSON  
FARMINGTON, CONNECTICUT  
3 DUNN  
1000 WEST 100  
WASHINGTON, D.C. 20005  
1000 1000 1000

296. A composition comprising a product produced by mixing in amounts effective to stabilize vinyl halide resins:

(i) a mono- or diorganotin compound wherein at least one atom bonded to tin is a halogen; and

(ii) a mercapto alkanol ester of a monocarboxylic acid.

297. The composition of claim 296, wherein the mercapto alkanol ester of a monocarboxylic acid has the formula:



wherein R is a linear or branched alkyl or alkenyl, aryl or aralkyl containing at least two carbon atoms; and R' designates a C<sub>2</sub> to C<sub>18</sub> alkylene.

298. The composition of claim 297, wherein R contains 6 to 38 carbon atoms.

299. The composition of claim 298, wherein R contains 8 to 18 carbon atoms.

300. The composition of claim 297, wherein R' contains 2 to 6 carbon atoms.

301. The composition of claim 296, wherein the monocarboxylic acid is selected from the group consisting of caprylic, pelargonic, capric, undecanoic, lauric, myristic, palmitic, stearic, isostearic, and mixtures thereof.

302. The composition of claim 296, wherein the mercapto alkanol ester of a monocarboxylic acid is selected from the group consisting of mercapto ethyl stearate, 3-thio-glyceryl myristate, mercapto ethyl palmitate and mercapto ethyl myristate.

303. The composition of claim 296, further comprising a vinyl halide resin.

JEAN-ES CHENARD  
FARMER, CHENARD  
& DUNN  
ATTORNEYS AT LAW  
WASHINGTON, D.C. 20004



304. The composition of claim 303, wherein the product produced by mixing the organotin compound and the mercapto alkanol ester of a monocarboxylic acid are present in an amount effective to stabilize the vinyl halide resin against heat or light.

305. The composition of claim 304, wherein the mercapto alkanol ester of a monocarboxylic acid is present in the range of 0.1 % wt. to 5 % wt. of the vinyl halide resin.

306. The composition of claim 303, wherein the vinyl halide resin is polyvinyl chloride.

307. A method of stabilizing a vinyl halide resin comprising adding to the vinyl halide resin in an amount effective to stabilize the vinyl halide resin a product produced by mixing:

(i) a mono- or diorganotin compound wherein at least one atom bonded to tin is a halogen; and

(ii) a mercapto alkanol ester of a monocarboxylic acid.

308. The method of claim 307, wherein the mercapto alkanol ester of a monocarboxylic acid has the formula:



wherein R is a linear or branched alkyl or alkenyl, aryl or aralkyl containing at least two carbon atoms; and R' designates a C<sub>2</sub> to C<sub>18</sub> alkylene.

309. The method of claim 308, wherein R contains 6 to 38 carbon atoms.

310. The method of claim 309, wherein R contains 8 to 18 carbon atoms.

311. The method of claim 307, wherein R' contains 2 to 6 carbon atoms.

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BRUNNEN HENDERSON  
PARIS 15 FRANCE  
B. D. N. N. E.  
TELEPHONE 21 20 20  
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312. The method of claim 30<sup>7</sup>, wherein the monocarboxylic acid is selected from the group consisting of caprylic, pelargonic, capric, undecanoic, lauric, myristic, palmitic, stearic, isostearic, and mixtures thereof.

313. The method of claim 30<sup>7</sup>, wherein the mercapto alkanol ester of a monocarboxylic acid is selected from the group consisting of mercapto ethyl stearate, 3-thio-glyceryl myristate, mercapto ethyl palmitate and mercapto ethyl myristate.

314. The method of claim 30<sup>7</sup>, wherein the vinyl halide resin is polyvinyl chloride.

315. In a composition for stabilizing a vinyl halide resin containing a mono- or diorganotin compound wherein at least one atom bonded to tin is a halogen, the improvement comprising the addition of a mercapto alkanol ester of a monocarboxylic acid.

316. The composition of claim 315, wherein the mercapto alkanol ester of a monocarboxylic acid has the formula:



wherein R is a linear or branched alkyl or alkenyl, aryl or aralkyl containing at least two carbon atoms; and R' designates a C<sub>2</sub> to C<sub>18</sub> alkylene.

317. The composition of claim 316, wherein R contains 6 to 38 carbon atoms.

318. The composition of claim 317, wherein R contains 8 to 18 carbon atoms.

319. The composition of claim 316, wherein R' contains 2 to 6 carbon atoms.

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320. The composition of claim 315, wherein the monocarboxylic acid is selected from the group consisting of caprylic, pelargonic, capric, undecanoic, lauric, myristic, palmitic, stearic, isostearic, and mixtures thereof.

321. The composition of claim 315, wherein the mercapto alkanol ester of a monocarboxylic acid is selected from the group consisting of mercapto ethyl stearate, 3-thio-glyceryl myristate, mercapto ethyl palmitate and mercapto ethyl myristate.

322. The composition of claim 315, wherein the mercapto alkanol ester of a monocarboxylic acid is present in the range of 0.1 % wt. to 5 % wt. of the vinyl halide resin to be stabilized.

323. The composition of claim 315, wherein the vinyl halide resin is polyvinyl chloride.

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